

Appendix B

DMMP and Site Habitat Report



Freeport Channel Widening Permitting

J200.50170

HDR

**SHINER MOSELEY
AND ASSOCIATES, INC.**

EXECUTIVE SUMMARY

The widening of the Freeport channel seaway of the Outer Turning Basin will generate 3.2 mcy of dredged material, including 2.9 mcy of clay and 300,000 cy of silty sand. The silty sand is suitable for certain beneficial uses in the area; however, no suitable beneficial uses for the 2.9 mcy of clay were identified through the process described below.

A DMMP Working Group was formed consisting of participants from U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), U.S. Environmental Protection Agency (USEPA), Texas Parks and Wildlife Department (TPWD), Texas General Land Office (TGLO), Texas Commission on Environmental Quality (TCEQ) and the National Oceanographic and Air Administration (NOAA), Third Party EIS Contractor (PBS&J), and the Ports Consultant HDR|Shiner Moseley and Associates, Inc. (HDRISMA). to identify regulatory issues related to the project and to identify and evaluate potential beneficial uses for the dredged material produced during the project.

There are a total of 17 alternative disposal sites, including confined placement areas, Offshore Dredged Material Disposal Sites (ODMDS), and two types of beneficial uses: habitat restoration and beach nourishment. A preliminary screening reduced the potential candidates to 6 options: three habitat restoration sites, two beach nourishment sites, and, as a last resort, an ODMDS.

Further analysis eliminated two of the beneficial use habitat restoration sites, Swan Lake and Bryan Lake, leaving the SH332 Beneficial Use site. The limited suitable material (300,000 cy) would support only one BU site, either habitat restoration or beach nourishment. Detailed cost estimates indicate that the cost of the SH 332 site restoration would exceed the cost of beach nourishment by approximately \$527,750.

The recommended Dredge Material Management Plan contains the following key features:

- Use a mix of dredging methods:
 - pipeline dredge to remove the 300,000 cy of silty sand
 - mechanical excavation to deepen the project area to provide hopper dredge access
 - hopper dredge for the remaining 2.9 mcy of clay
- Place the 300,000 cy of sand on Quintana Beach in front of the Seaway Placement Area to:
 - provide accessible public beach
 - protect the containment levee.
- Place the 2.9 mcy of clay in the ODMDS, the permitting of which should begin immediately.

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I. INTRODUCTION

1. Project Description and Area Setting

The existing Federal channel is approximately 5.2 miles in length and is approximately 400 ft in width at the bottom. Water depths in the Freeport Ship Channel are currently maintained by the USACE to a depth of -47 ft from Mean Low Tide (MLT). The proposed project entails widening the Freeport Ship Channel from the Outer Turning Basin to the -49 ft contour. The widening increment will be at the same depth as the existing Federal Channel. Portions of the Jetty Channel and all of the Entrance Channel will be widened to a total bottom width of 600 feet. Exhibit A is a copy of the original U.S. Army Corps of Engineers (USACE) Permit Application #23752 that covers the proposed widening. The Brazos River Harbor Navigation District (Port Freeport or Port) is the permit applicant.

The purpose of the project is to permit the use of non-Federal funds to widen the existing Federal Channel. The need is to eliminate operational constraints preventing the transit of larger ships into the Port of Freeport. The constraints are threefold: (a) limits on large vessels when the wind exceeds 20 knots or currents exceed 2 knots, (b) limitations on nighttime transit, and (c) restriction on two way traffic. Elimination of these operational constraints will increase port efficiency and reduce shipping costs due to delays.

Construction of the project will generate approximately 3.2 mcy of uncontaminated dredged material that consists of 2.9 mcy of clay and 300,000 cy of silty sand.

The Freeport area is unique in that it does not have barrier islands or extensive bays. The primary tributaries, the Brazos River and the San Bernard River, drain directly into the Gulf of Mexico from the mainland rather than via bays between the mainland and barrier islands and do not provide freshwater inflow at the Port.

The Freeport Ship Channel follows the lower portion of what is called the "Old River." In 1929 the lower 6.8 miles of the Brazos River were diverted via a new man-made channel into the Gulf approximately 6 miles west of the Old River. The overall effect of this relocation was the elimination of significant currents in the port area, the elimination of riverine flood flows through the port, and the direct discharge of the sediment laden river water into the Gulf. Benefits to the port include less maintenance dredging, fewer operational interruptions due to high water, and increased navigation safety.

The beachfront on both sides of the Ship Channel is developed. On the north lies the community of Surfside, population 763. It is predominately a single family residential area, with some beach related commercial development. On the south lies the community of Quintana, population 38, which is single family residential. A dominant feature of Quintana is the Freeport LNG terminal, which is under construction. Two large dredged material disposal areas and Bryan Beach State Park are also in Quintana.

2. Beneficial Uses Concept

Federal policy suggests that dredged material be used for beneficial purposes if deemed practical. Typically, beneficial uses may include a wide spectrum of purposes:

- Habitat creation or restoration.
- Shoreline restoration.
- Beach nourishment.
- Dune reconstruction.

In making the decision as to whether or not a beneficial use is feasible, a number of factors may be considered:

- Likelihood of success or failure.
- Environmental effects.
- Construction costs.
- Sustainability.
- Type and extent of benefits.

3. Approach

The following steps outline the steps taken during the planning and permitting process. Beneficial uses have been considered throughout the process.

Step 1 – Conducted Regulatory Assessment

Meetings were held with the regulatory and resource agencies (U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), U.S. Environmental Protection Agency (USEPA), Texas Parks and Wildlife Department (TPWD), Texas General Land Office (TGLO), Texas Commission on Environmental Quality (TCEQ) and the National Oceanographic and Air Administration (NOAA)) to get opinions and comments regarding the proposed project. Beneficial uses were proposed during these meetings, primarily wetland restoration and an offshore habitat berm.

Step 2 – Drafted Initial Application

An initial draft permit application was prepared and submitted to the USACE on April 14, 2005 and assigned permit application number 23752. Three beneficial use possibilities were identified and included in the initial permit application: beach nourishment, offshore habitat berm, and onshore wetlands enhancement.

Step 3 – Participated in Joint Evaluation Meeting (JEM)

A Joint Evaluation Meeting was held with the Port, USACE, TXGLO, TCEQ, TPWD, USEPA, USFWS, NMFS, and HDRISMA to discuss the project concept and details of various beneficial uses that were identified. The agencies participating in the JEM generally acknowledged their support for the concept and provided comments.

Step 4 – Scoping Meeting and NEPA Process

The NEPA compliance process formally started with the Scoping Meeting on November 25, 2005. The idea of beneficial use of dredged material was presented to state and federal agency representatives and the public, including the formation of a DMMP Work Group. The Work Group consisted of representatives from the following: U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), U.S. Environmental Protection Agency (USEPA), Texas Parks and Wildlife Department (TPWD), Texas General Land Office (TGLO), Texas Commission on Environmental Quality (TCEQ), Port, Third Party EIS Contractor (PBS&J), and the Ports Consultant HDRIShiner Moseley and Associates, Inc. (HDRISMA).

Step 5 - Operations of Work Group

Between early December 2005, and late February 2006, the Work Group met four times and completed the following steps:

- Step 5-A - Decided on an approach to identify and evaluate alternatives.
- Step 5-B - Identified a total of 17 disposal sites of which 9 sites were beneficial use alternatives.
- Step 5-C - Used available information to screen the 9 potential beneficial uses down to 3 sites meriting further scrutiny.
- Step 5-D - Visited the remaining candidate sites and collected additional site specific information and prepared summary documents.
- Step 5-E - Reviewed results with the DMMP Work Group and made recommendations for an overall Dredged Material Management Plan.
- Step 5-F - Compiled the results into a plan for incorporation in the EIS and other appropriate NEPA compliance documents.

Section II of this document describes the alternatives analyzed and how the process was used to arrive at the recommended DMMP. Section III of this document presents the findings and results of the process.

II. ALTERNATIVES IDENTIFICATION AND EVALUATION

1. Introduction

For preliminary screening purposes, potential onshore placement sites within approximately 5 miles of the project site were considered. Offshore placement was also considered. The potential placement areas included both potential beneficial use sites as well as conventional disposal sites. A total of 17 placement areas were identified in 4 major categories. Of the 17 alternatives below, 9 can be considered beneficial uses (denoted with an asterisk):

Marsh Restoration and Creation/GIWW Bank Stabilization

- Swan Lake *
- Bryan Lake *
- Highway 332 Marsh *
- GIWW Bank Stabilization *

Upland Confined Placement Area (UCPA)

- DMPA "Seaway"
- DMPA "85"
- DMPA "2/3"
- DMPA "86/87"
- DMPA "88"
- DMPA "7"
- DMPA "1"

Offshore Placement

- Offshore Berm – Fish Habitat *
- Offshore Berm – Wave Protection *
- Nearshore Berm – Beach Feeder and Surf Break *
- ODMDS Placement

Beach Nourishment

- Surfside *
- Quintana *

Table II.1 is a matrix that assesses the suitability of each site according to the following criteria:

- Dredge Method
- Potential Capacity – Silty Sand
- Potential Capacity – Clay
- Beneficial Use
- Containment Requirements
- Regulatory Requirements
- Issues
- Viable Alternatives

All confined placement areas were eliminated due to two reasons: resource agencies require that dredged material be used beneficially, if possible, and the existing confined placement areas have very limited available capacity. The preliminary screening reflected in Table II.1 identifies five potential beneficial uses for the 300,000 cy of silty-sand material that merited further attention:

- Marsh restoration at Swan Lake
- Marsh restoration at Highway 332
- Marsh restoration at Bryan Lake
- Beach nourishment at Quintana Beach – adjacent to Seaway DMPA
- Beach nourishment at Surfside Beach

Other potential beneficial use sites were eliminated for the following reasons:

- Gulf Intracoastal Waterways (GIWW) Bank Stabilization was determined to be unsuitable due to inadequate capacity and difficulty of containment.
- Offshore Berm – Fish Habitat. These merits are debatable and similar benefits would result from placement in a designated disposal area.
- Offshore Berm – Shoreline Protection. A cursory analysis indicated that the benefits were negligible.

- Offshore Berm – Beach Feeder. Benefits would be very minimal and most (90%) of the dredged material is not suitable for beach nourishment.

The three potential habitat restoration sites, refer to Figure 1, are each briefly discussed below. A habitat assessment with photos is included as Exhibit B.

Swan Lake Beneficial Use Site

This potential beneficial use site is located approximately two miles east of the Freeport Jetty Channel. The overall area identified as a potential beneficial use site is roughly 578 acres, which includes open water, tidal streams, wetlands, and potentially some uplands. It is bounded on the north by the GIWW, on the west by a canal connected to the GIWW, and on the east and south by developed properties and roadways. As a potential beneficial use site for the placement of dredged materials, the focus of the initial investigation was on the open water portions for wetland restoration and/or creation. Two distinct bodies of open water were identified by examining an aerial photograph of the area. The western body is roughly 85 acres in size and the eastern body is approximately 225 acres in size, refer to Figure 2. In aggregate, the two bodies of open water encompass approximately 310 acres.

Ownership of these two areas was not confirmed during the initial investigation. However, based on the nature of the bodies of water, it is assumed they are state owned land.

The initial investigation also compared a 2005 aerial photograph against historic photographs available on the Texas General Land Office web site. An aerial photograph from 1944 was used for comparison purposes. Although a significant portion of the 225 acre area was not covered in the 1944 photograph, the nature of both areas appears to be quite similar, with the exception of the western-most portion of the 85 acre site that appears to encompass a larger area that is now the open water. In general, the comparison indicates that over the past 61 years there has been no substantial loss of wetland acreage in this area, beyond that described above for the 85 acre site.

A site visit was performed on 12/20/05 to supplement the initial investigation efforts. Photographs obtained during that visit are provided in Exhibit 2 of Exhibit B.

The following pertinent observations were made during the site visit:

- There is evidence of oyster beds and fishing activities (i.e., presence of traps) in the 225 acre eastern body of open water.
- There is evidence of oyster beds in the 85 acre western body of open water.
- No evidence of sea grass presence was found; however, the visit was limited to an investigation along a portion of the shorelines and not the full bodies of water.

Bryan Lake Beneficial Use Site

This potential beneficial use site is located approximately three miles west of the Freeport Jetty Channel, refer to Exhibit 3 of Exhibit B. The overall area identified as a potential beneficial use site is roughly 913 acres, which includes open water, tidal streams, wetlands, and potentially some uplands. It is bounded on the south by the Gulf Intracoastal Waterway (GIWW), on the west by the Bryan Mound Strategic Petroleum Reserve (SPR) facility, on the north by a levee with roadway, and on the east by a developed roadway. As a potential beneficial use site for the placement of dredged materials, the focus of the desktop investigation was on the open water portions for wetland restoration and/or creation. Three distinct bodies of open water were identified by examining aerial photographs of the area. The east body is approximately 50 acres in size, the west body is approximately 100 acres in size, and the central area is approximately 30 acres in size, refer to Figure 3. In aggregate, the three bodies of open water encompass approximately 180 acres.

Ownership of these three areas was not confirmed during the desktop investigation. However, based on the nature of the bodies of water it is assumed they are state owned land.

The initial desktop investigation also compared a recent aerial photograph against historic photographs available on the Texas General Land Office web site. An aerial photograph from 1944 was used for comparison purposes. Based on the comparison it is evident that all three bodies of water have been in existence since 1944. Both the western 100 acre area and the central 30 acre area appear to be similar in both photographs. The eastern 50 acre area appears to be smaller in size today as compared to 61 years ago, which may indicate accretion in the area. In general, the comparison indicates that there has been no substantial conversion of wetlands or uplands to open water in this area over the past 61 years.

A site visit was performed on 12/20/05 to supplement the desktop investigation efforts. Photographs obtained during that visit are provided as in Exhibit 2 of Exhibit B. During that site visit discussions were held with Mr. Jimmy Salinas, Environmental Safety and Health Coordinator for the Bryan Mound SPR facility to obtain his input on potential beneficial use projects adjacent to the facility. The following pertinent observations were made during the site visit and discussions with Mr. Salinas:

- There is evidence of oyster beds in the 100 acre western body of open water.
- Mr. Salinas indicated that the SPR facility would likely have strong reservations about marsh creation in the 100 acre and 30 acre areas because of security concerns. Specifically, the growth of marsh grasses would restrict perimeter security vision in this area.
- There was no obvious evidence of oyster beds in the 50 acre area and SPR did not have any specific concerns with potential beneficial use for marsh creation in this area.
- No evidence of sea grass presence was found; however, the visit was limited to an investigation along a portion of the shorelines and not the full bodies of water.

SH 332 Bridge Beneficial Use Site

This potential beneficial use site is located approximately one mile northeast of the Freeport Jetty Channel, refer to Exhibit 1 of Exhibit B. The overall area identified as a potential beneficial use site is roughly 328 acres, which includes open water, tidal streams, wetlands, and potentially some uplands. It is bounded on the north and west by canals, on the south by developed land and roadways, and on the east by undeveloped land. State Highway (SH) 332 runs through the center of this area in a general north-south direction. As a potential beneficial use site for the placement of dredged materials, the focus of the desktop investigation was on the open water portions for wetland restoration and/or creation. Four distinct bodies of open water were identified by examining aerial photographs of the area. Two areas, 42 acres and 12 acres in size respectively, are located west of SH 332 and two areas, each 4 acres in size are located east of SH 332, refer to Figure 4. In aggregate, the four areas of open water encompass approximately 62 acres.

Ownership of these four areas was not confirmed during the desktop investigation. However, based on the nature of the 42 acre body of water, it is assumed that it is state owned land.

The desktop investigation also compared a recent aerial photograph against historic photographs available on the Texas General Land Office web site. Aerial photographs from 1944 and 1965 were used for comparison purposes. Although the 1944 photograph of the area is not very clear, the 1965 photograph indicates that the two 4 acre areas were bodies of water 40 years ago, with stronger evidence of this on the northernmost 4 acre area. Furthermore, the comparison with the 1965 photograph indicates that the areas west of SH 332 were wetlands and have broken up over the past 40 years to become predominantly open water.

A site visit was performed on 12/20/05 to supplement the desktop investigation efforts. Photographs obtained during that visit are provided in Exhibit 2 of Exhibit B for informational purposes. The following pertinent observations were made during the site visit:

- No evidence of oyster beds in any of the areas was found; however, the visit was limited to an investigation along a portion of the shorelines and not the full bodies of water.
- No evidence of sea grass presence was found; however, the visit was limited to an investigation along a portion of the shorelines and not the full bodies of water.
- The two 4 acre areas and the 12 acre area appear to be functional wetlands with tidal conveyances.
- The 42 acre site appears to be broken up marsh area with a predominance of open water.

For the reasons discussed above, the only viable marsh restoration project is at the SH 332 bridge area. The other alternative beneficial use is placement of the material on the beach to counter shoreline erosion. The 300,000 cy of silty sand from the Jetty Channel is available and suitable for either beneficial use.

A cost comparison of using the silty sand for the SH 332 marsh creation and beach nourishment was completed. The two alternatives are discussed below:

Marsh Restoration.

Dredged material produced during this project consists of silty sand and stiff clays. Stiff clays are not suitable for proper vegetation growth and wildlife habitat and therefore not suitable for marsh restoration uses. Approximately 300,000 cy of the silty sand material located in the Jetty Channel is available to be placed in the SH 332 Bridge Beneficial Use location. Roughly 200,000 cy would be used to properly fill one of the two areas to an elevation that would allow growth of low marsh habitat for marsh restoration. The remaining 100,000 cy would be used to properly fill in the other area to an elevation that would allow growth of low marsh habitat for marsh restoration.

Assumptions used in the analysis are as follows:

- A single 20" to 24" hydraulic dredge unit will be mobilized and used for the placement of materials in both the SH 332 Bridge Beneficial Use locations.
- The average pumping distance for the SH 332 Bridge Beneficial Use areas is approximately 1.7 nautical miles. The pipeline will cross the GIWW. The high volume of barge traffic associated with the GIWW will require significant operational interruptions. The pipeline will have to be outfitted with a diffuser or baffle at the discharge end to allow for a better control of the discharged dredged material into the marsh area.

Beach Nourishment. Approximately 300,000 cy of the silty sand material, located in the Jetty Channel is available to be placed on either the Surfside or the Quintana Beach, but not a combination thereof due to the relatively small amount of material available. Assumptions include:

- A single 20" to 24" hydraulic dredge unit will be mobilized and used for the placement of the materials on one or the other beach, but not split between the two.
- The average pumping distance for beach placement is approximately 2.0 nautical miles. No crossing of the ship channel is assumed here; however, one will be required if the material goes to Quintana Beach.

The costs of the two alternatives are as follows:

ITEM DESCRIPTION	QUANTITY		UNIT COST	TOTAL	EXTENDED TOTALS
	NUMBER	UNIT			
Beach Nourishment					\$1,066,000
Mob/Demob (2)	1	LS	\$2,000.00	\$2,000	
300 hp bulldozer	360	HR	\$160.00	\$57,600	
200 hp bulldozer	360	HR	\$120.00	\$43,200	
Pipeline	8,500	FT	\$12.00	\$102,000	
Dredge	360	HR	\$1,800.00	\$648,000	
25% Contingency				\$213,200	
Marsh Placement					\$1,593,750
Mob/Demob (3)	1	LS	\$4,500.00	\$4,500	
Dredge (4)	450	HR	\$1,800.00	\$810,000	
Backhoe/barge					
1. Levee	300	HR	\$350.00	\$105,000	
2. Discharge	450	HR	\$350.00	\$157,500	
3. Deconstruct	100	HR	\$350.00	\$35,000	
Pipeline	9,000	FT	\$12.00	\$108,000	
Weir	1	LS	\$20,000.00	\$20,000	
Marsh Buggy	100	HR	\$350.00	\$35,000	
25% Contingency				\$318,750	
Difference					\$527,750

Notes:

1. Original mob/demob of dredge equipment assumed same for both options at ~\$500,000
2. Beach nourishment requires additional mob/demob of two bulldozers
3. Marsh placement requires additional mob/demob of marsh backhoe with barge and marsh buggy
4. Dredge production reduced by 25% due to shallow depths at marsh and need for elevation control

Summary

- The additional cost associated with marsh restoration at SH 332 bridge, relative to beach placement, is approximately \$527,750.
- There is a great deal of public support for placement of the silty sand material on either the Quintana or Surfside beach. Removing the littoral zone material and placing it further inland on a marsh is contrary to the evident public desires.
- The nature of the stiff clay material is not optimally suited for either habitat restoration or beach nourishment; consequently, it should go to an Offshore Dredged Material Disposal Site (ODMDS).

III. FINDINGS AND RECOMMENDATIONS [I'D EITHER GET RID OF THIS OR THE EXECUTIVE SUMMARY]

A. New construction material volume and characteristics

1. The initial construction of the widening will generate 3.2 mcy of dredged material, which includes 300,000 cy of silty sand and 2.9 mcy of stiff clay.
2. The 300,000 cy of silty sand can be used for either of two types of beneficial use in the immediate project area: habitat restoration or beach nourishment.
3. The stiff clay is not suitable for the identified beneficial uses.

B. Maintenance Material Volume and Characteristics

1. The average maintenance volume for the widening increment is on the order of 1 mcy per year.
2. It is fine silty clay and is not suitable for any of the available beneficial uses.

C. Dredging Methods

1. Several scenarios are possible depending on the equipment available at the time of dredging. The most likely scenario involves a mix of hopper dredge, pipeline dredge, and mechanical excavation.
2. A pipeline dredge will be used to excavate the silty sand and pump it to the beach nourishment site.
3. Mechanical excavation will be used to deepen the project area to about 25-30 feet, which is the minimum operation depth for a hopper dredge.
4. A hopper dredge will be used to excavate the stiff clay and transport it to the Offshore Dredged Material Disposal Site (ODMDS).

D. Alternative and Recommended Placement Areas

1. A total of 17 potential placement areas were identified (see Table II.1) and divided into four separate categories:
 - Upland Confined Upland Placement Area (UCPA).
 - Offshore Dredged Material Disposal Sites (ODMDS).
 - Beneficial Uses – Habitat Restoration (BU – HR).
 - Beneficial Uses – Beach Nourishment (BU-BN).
2. An initial screening reduced the original 17 alternatives to 5 alternatives meriting further attention.
 - All existing UCPAs were eliminated due to other commitments and limited capacity. No new UCPAs were proposed due to the scarcity of suitable upland sites.
 - To comply with existing Federal guidance, the ODMDS are considered only as a last resort if no other practical options exist.

- Three potential Beneficial Use – Habitat Restoration sites were identified: Swan Lake, Bryan Lake, SH 332 Bridge.
- Two Beneficial Use sites – Beach Nourishment were identified: Quintana and Surfside.

3. The above surviving alternatives were subjected to further evaluation, which included site visits to better characterize existing conditions, placement options, and potential benefits.

- Two of the BU – HR sites, Swan Lake and Bryan Lake, were eliminated due to the presence of oysters and existing good habitat that might be significantly degraded by any restoration attempts.
- The other BU – HR site SH 332 Bridge appears to offer potentially attractive habitat restoration options.
- Both the BU – BN sites offered positive potential. Closer evaluation favors Quintana in front of the Seaway Confined Placement Area for two public purposes:
 - reestablish public access to the public beach in front of the disposal area
 - provide erosion protection for the containment levee of the Seaway Confined Placement Area.
- Because of the limited volume of suitable material (300,000 cy of suitable silty sand) for the beneficial uses, only one project can be done – either the habitat restoration or beach nourishment.
- A more in depth cost comparison of the SH 332 and Quintana Beach was done. Placement at the SH 332 exceeds the cost of placement at Quintana by approximately \$527,750.
- Public support is for beach nourishment.

E. Summary of Recommended Placement Areas

- Place the 300,000 cy of silty sand on the Quintana beach in front of Seaway UCPA to provide improved public access and provide erosion protection for the UCPA containment.
- Place the remaining 2.9 mcy of stiff clay in the ODMDS.
- Maintenance material should be placed in the ODMDS.
- Permitting of the ODMDS should be expedited.



Figure 1



Figure 2



Figure 3



Figure 4

Figure II.1
 Freeport Entrance & Jetty Channel Widening Project
 Dredge Material Management Plan – Placement Evaluation Matrix

Placement Alternative	Dredge Methodology	Potential Capacity Silt-Sand Material ¹	Potential Capacity Clay Material ²	Beneficial Use	Containment Requirements	Regulatory Requirements (Beyond 404/10 Permit)	Issues	Viable Alternative
Swan Lake Marsh Restoration/Creation	Hydraulic	~ 100K CY (33%)	~ 250K CY (20%)	Yes	ICW Interface	None	<ul style="list-style-type: none"> Presence of oyster beds Active fishing area Freeport Wierles Sect. 216 study (conflict) 	No
Bryan Lake Marsh Restoration/Creation	Hydraulic	~ 60K CY (20%)	~ 0K CY (0%)	Yes	None	None	<ul style="list-style-type: none"> Presence of oyster beds Strategic Petroleum Reserve security concerns Potential future mitigation or development site (Port) 	No
332 Bridge Marsh Restoration/Creation	Hydraulic	~ 300K CY (10%)	~ 0 CY (0%)	Yes	Drainage Canal Interface	None	<ul style="list-style-type: none"> Presence of oyster beds Active fishing area 	Yes
ICW Bank 'Stabilization'	Hydraulic	Not Suitable (0%)	77% ³	Yes	Yes	None	<ul style="list-style-type: none"> Construction difficulty (long, narrow placement corridor) Containment needs along bank a major factor 	No
Beach Placement – Quintana or Surfside	Hydraulic	100% (Suitable Mat'l Only)	Not Suitable (0%)	Yes	None	None	<ul style="list-style-type: none"> Quality of sandy material 	Yes
Beach Placement – DMPA "Seaway" Levee Protection	Hydraulic	Not Suitable (0%)	~ 150K CY (12%)	Yes	None	None	<ul style="list-style-type: none"> Undertaking would most likely preclude driving on this section of beach Material would be sacrificial in nature, fines would be on beach for a long time 	No
Upland Confined Placement DMPA "Seaway"	Hydraulic	Not Considered for Sandy Mat'l	~ 150K CY (12%)	No	Dike Raising Required	None	<ul style="list-style-type: none"> Freeport LNG borrow pit not large enough to accommodate material without additional dike raising efforts Port Freeport prefers not to place material in this Port controlled DMPA 	No
Upland Confined Placement DMPA "85"	Hydraulic	Not Considered for Sandy Mat'l	~ 0 CY (0%)	No	Dike Raising Required	None	<ul style="list-style-type: none"> DMPA Capacity has been reached without significant dike raising 	No
Upland Confined Placement DMPA "2 / 3"	Hydraulic	Not Considered for Sandy Mat'l	~ 0 CY (0%)	No	In Place	None	<ul style="list-style-type: none"> Limited existing capacity, is already designated for use (Freeport LNG) 	No
Upland Confined Placement DMPA "86 / 87"	Hydraulic	Not Considered for Sandy Mat'l	~ 0 CY (0%)	No	In Place	None	<ul style="list-style-type: none"> DMPA is designated for ICW maintenance material placement 	No
Upland Confined Placement DMPA "88"	Hydraulic	Not Considered for Sandy Mat'l	~ 0 CY (0%)	No	In Place	None	<ul style="list-style-type: none"> DMPA is designated for ICW maintenance material placement 	No
Upland Confined Placement DMPA "7"	Hydraulic	Not Considered for Sandy Mat'l	~ 0 CY (0%)	No	In Place	None	<ul style="list-style-type: none"> DMPA capacity has been reached Adjacent property restrictions do not allow expansion 	No
Upland Confined Placement DMPA "1"	Hydraulic	Not Considered for Sandy Mat'l	~ 0 CY (0%)	No	In Place	None	<ul style="list-style-type: none"> Limited existing capacity is already designated for use (Freeport LNG and Federal Channel Maintenance) 	No

Figure II.1
 Freeport Entrance & Jetty Channel Widening Project
 Dredge Material Management Plan – Placement Evaluation Matrix

Placement Alternative	Dredge Methodology	Potential Capacity Silty-Sand Material ¹	Potential Capacity Clay Material ²	Beneficial Use	Containment Requirements	Regulatory Requirements (Beyond 404/10 Permit)	Issues	Viable Alternative
Offshore Berm – Fish Habitat	Mechanical / Hydraulic	100% (Including Entrance Chnl)	100% (Including Entrance Chnl)	Yes (See Issues)	None	102/103	<ul style="list-style-type: none"> ▪ The typical application of this concept is considered a Beneficial Use; however the project's application was not considered a true Beneficial Use through further analysis (i.e., concept is not similar to model concept in Mobile, AL. ▪ The same 'benefit' would occur with placement in the ODMDS, just in a different location (i.e., a location that has been used for dredge material placement in the past. 	No
Offshore Berm – Wave Protection	Mechanical / Hydraulic	100% (Including Entrance Chnl)	100% (Including Entrance Chnl)	Yes (See Issues)	None	102/103	<ul style="list-style-type: none"> ▪ The typical application of this concept is considered a Beneficial Use; however the project's application was not considered a Beneficial Use through further analysis. 	No
Nearshore Berm – Beach Feeder Berm / Surf Break	Hydraulic	100% (Including Entrance Chnl)	Not Considered for Clayey Mat ¹	Yes	None	102/103	<ul style="list-style-type: none"> ▪ Sandy materials better suited for direct beach placement in this project's application. 	No
ODMDS Placement	Mechanical / Hopper	100% (Including Entrance Chnl)	100% (Including Entrance Chnl)	No	None	102/103	<ul style="list-style-type: none"> ▪ Designated ODMDS 	Yes

¹ Based on preliminary analysis of geotechnical information, the quantity of silty-sand materials in the Jetty Channel is assumed to be approximately 300,000 cubic yards.

² Based on the overall quantity of material in the Jetty Channel with the aforementioned estimated quantity of silty-sand materials removed, the quantity of clay materials is assumed to be approximately 1,300,000 cubic yards (the remaining 1.6 MCY of material is located in the Entrance Channel).

³ ICW 'Bank Stabilization' Capacity was not calculated because of the multiple factors that make this alternative non-viable.

Exhibit A-Permit Application



April 14, 2005

J200.40142

Mr. Dolan Dunn
USACE – Galveston District
P. O. Box 1229
Galveston, Texas 77553-1229

**RE: PERMIT APPLICATION TO WIDEN PORTIONS OF FREEPORT
HARBOR JETTY AND ENTRANCE CHANNEL USING NON-FEDERAL
FUNDS**

Dear Mr. Dunn:

I. EXECUTIVE SUMMARY

- **The Brazos River Harbor Navigation District of Brazoria County, Texas (also known as Port Freeport) is seeking a USACE Section 10/404 permit to widen portions of the Entrance and Jetty Channel of the Freeport Harbor Channel by up to 200 feet (from 400 feet up to 600 feet). The project depth will remain the same at 45 feet in the Jetty Channel and 47 feet in the Entrance Channel.**
- **The PURPOSE of the proposed project is to widen the channel to eliminate existing operational constraints that include (a) one-way traffic, (b) daylight operations only for larger vessels, and (c) restrictions that do not allow the larger vessels requiring waivers to enter port when winds exceed 20 knots or cross-currents exceed 0.5 knots.**
- **The project NEED is the elimination of the operational constraints to allow vessels to avoid delays, thereby reducing shipping costs and logistical problems.**
- **The goal is to have the widening complete during 2007.**
- **The applicant intends to seek federal assumption of maintenance if permitted and constructed as a non-federal improvement.**
- **The widening will generate approximately 2 million CY of uncontaminated material, predominantly clay/silty clay and sand/sandy silt. The material will be used for two beneficial purposes: (a) creation of an offshore berm to provide a topographic high with hard substance; and (b) beach nourishment.**
- **All work will be done in compliance with design standards applicable to federal projects in order to be consistent with any results from the ongoing, congressionally authorized federal feasibility study for widening and deepening all major segments of the Freeport Harbor Channel.**
- **Preliminary analyses of key issues have not identified any significant negative impacts or serious concerns. These include jetty stability, cultural resources, dredging, sediment quality, dredged material placement, water quality, endangered species, etc.**

II. EXISTING CONDITIONS

II.1 Existing Project Dimensions

The existing Freeport Harbor Channel consists of the following authorized components:

Entrance Channel	47 ft x 400 ft
Jetty Channel	47 ft x 400 ft
Lower Turning Basin	45 ft x 750 ft
Inside Channel	45 ft x width varies
Brazosport Turning Basin	45 ft x 1,000 ft
Upper Turning Basin	45 ft x 1,200 ft
Brazos Harbor Channel	36 ft x 200 ft
Brazos Harbor Turning Basin	36 ft x 750 ft

These channel reaches normally have an advance maintenance component and an overdredge allowance in addition to the authorized depths. The proposed widening will affect only the Entrance Channel and the Jetty Channel.

II.2 Operational Constraints Resulting from Existing Channel Dimensions

The widening will allow deep draft vessels to enter port under a broader range of environmental conditions than is possible in the 400-foot channel. At present, all deep draft vessels are limited to one-way traffic in the Freeport Channel. Vessels over 750 feet long or over 107 feet wide – which includes most crude oil and chemical tankers, the largest segment of Freeport traffic – are also limited to daylight transits. Vessels with beams over 145 feet are further limited and require waivers to enter port.

Port entry is further restricted by the effects of along-shore cross-currents, which vary in direction and velocity up to 3 knots. Depending on the ship's speed and the current's velocity, the Harbor Pilot must apply as much as 14 degrees of rudder "leeway" to counter the cross-current effects. That "crabbing" approach has the ship at an angle to the centerline of the channel as it approaches the jetties, which makes its effective width in the channel greater than the vessel's beam. A cross-current strong enough to restrict entrance for deep-draft vessels occurs approximately five percent of the time. For the largest vessels, entrance could be restricted as much as 25 to 30 percent of the time. The cross-current affects maneuverability as the vessel starts into the jetties and the effects are no longer uniform. Widening the channel would reduce the effects of cross-current by allowing for a wider beam aspect approaching the jetties and providing more room to maneuver in the Jetty Channel. Widening the channel would also allow longer vessels to enter Port Freeport, since the vessel's beam aspect is influenced by length as well as width and amount of leeway being held.

For the most part, the largest tankers currently able to call at the Seaway and ConocoPhillips terminals are AFRAMAX size – 75,000 to 110,000 deadweight tons

(DWT), with the largest on the order of 800 feet long and 138 feet wide. The terminal operators would like to be able to accommodate the larger SUEZMAX tankers – 110,000 to 150,000 DWT, with typical dimensions on the order of 900 feet long and 148 feet wide. Under current conditions, those larger vessels can enter the port only under ideal weather and sea conditions after undergoing the Port’s waiver process. Widening the channel would substantially increase the operating window for those larger tankers. For many of the smaller deep draft vessels, widening would also allow for relaxation of the existing requirements for one-way traffic and daylight transits.

These substantial benefits for widening are reflected in the USACE’s “Freeport Harbor, Texas, Navigation Improvement Reconnaissance Report Section 905(b) Analysis (October 2002)”. That report states that widening will result in direct transportation cost savings for existing and future vessel and terminal operators in several ways. One of benefits of widening is decreased vessel downtime associated with the ‘daylight hours only’ transit restriction for vessels in excess of 750 feet in length. Another is decreased vessel downtime associated with one-way traffic restrictions for deep draft vessels – deep draft crude carriers represent the majority of the 3,000+ vessels calling annually. Reducing constraints based on the effects of along-shore cross-currents is another significant benefit stated in the report. Widening will also improve the potential for much larger vessels to enter port. The study notes that waivers have been granted for vessels up to 900 feet long and 160 feet wide, when wind is below 15 knots and cross-current is not more than one-half knot, and that numerous requests have been denied for ships 920 to 950 feet long.

Some benefits will also be achieved in the form of improved navigation safety as a result of the increased maneuvering room, especially between the jetties. Also, a widened channel will be less restrictive for other traffic during maintenance dredging and when the other improvements are initiated in the future.

II.3 Activity and Trends at Port Freeport

Total tonnage through the Port has steadily and consistently increased over the past ten years as indicated below. Crude oil represented approximately two-thirds of the total tonnage in 2003. Trends for 2004 and 2005 are consistent with the pattern shown by these statistics.

Year	Total	Year	Total
1994	17,450	1999	28,076
1995	19,662	2000	28,966
1996	24,571	2001	30,143
1997	26,281	2002	27,164
1998	29,014	2003	30,537

Given national and international trends, the growth over the last decade is expected to continue in the future. In addition to the growth in existing cargos, there are several

recent new initiatives in the area that will contribute to even more growth. These include the following:

- **Container / General Cargo Diversification.** The Port has initiated a major diversification effort aimed at a wide range of new cargos. This has included (a) a master planning project to assess potential uses for the Port's 8,000± acres, (b) permitting and design of the first phase of a modern container terminal, and (c) other initiatives.
- **LNG Terminal.** Freeport LNG recently received Federal Energy Regulatory Commission (FERC) and USACE approvals for an LNG terminal at Quintana. As currently permitted, the terminal will have one berth and a throughput capacity of 1.5 bcf/d and will generate one ship call every 3 days. While no application for expansion has been filed, Freeport LNG has notified FERC that the plans for expansion include a second berth and additional storage.

Increased ship traffic resulting both from growth of existing business and from new business will increase the operational congestion on the existing system. The proposed widening of the Entrance Channel and Jetty Channel up to 600 feet will significantly lessen the congestion by removing most of the operational constraints.

II.4 Ongoing Federal Feasibility Study

The USACE, under the authority of Section 216 of the Flood Control Act of 1970 (P.L. 91-611), is currently conducting a feasibility study for widening and deepening the Freeport Harbor Channel. This study will evaluate the incremental widening and deepening of the project up to dimensions of 600 feet by 60 feet. The \$5.4 million study is being jointly funded by the USACE and Port Freeport.

The timing of the feasibility study and subsequent authorization and appropriations are dependent upon the federal budget process. A current optimistic view indicates that the federal project could be online in the 2012 timeframe.

Local interests hope to have the widening permitted and constructed by late 2007. All design features of the improvements will be done in strict compliance with USACE design standards for federal projects to ensure compatibility.

III. THE CASE FOR CHANNEL EXPANSION

III.1 Introduction

There is a widely recognized need to expand the Freeport Harbor Channel. The 2002 USACE Reconnaissance Study (Freeport Harbor, Texas Navigation Improvement Reconnaissance Report, Section 905(b) Analysis) stated the need to improve the existing conditions.

“The existing conditions that give rise to the need for channel enlargements at Freeport Harbor are the existing channel dimensions, which are inadequate for the length and draft of many of the crude petroleum and chemical tankers operating at Freeport. As a result of channel constrictions, operational practices have been instituted that result in light loading and additional transit times at Freeport Harbor.”

The Port is keenly aware of the need to both widen and deepen the channel, which is being evaluated in the ongoing federal feasibility study. The Port, in cooperation with Port Users, has opted to pursue obtaining a permit to widen the Jetty Channel and Entrance Channel from 400 feet up to 600 feet in order to expedite the substantial benefits of widening, with a target completion date in 2007. This permit action should allow the widened channel to be in operation at least 5 years earlier than the proposed federal improvements.

The decision to expeditiously pursue the widening alone in lieu of the deepening is based on several factors; namely, widening will (a) relieve serious operational constraints, (b) benefit the largest number of shippers, and (c) be substantially less costly.

III.2 Purpose and Need

The purpose and need for the widening can be succinctly stated.

- The purpose of the proposed project is to widen the channel to eliminate existing operational constraints that include (a) one-way traffic, (b) daylight transit only of the larger vessels, and (c) restrictions that do not allow large ships requiring waivers to operate when winds exceed 20 knots or cross-currents exceed 0.5 knots.
- The project need is the elimination of the operational constraints, allowing vessels to avoid delays, thereby reduce shipping costs and logistical problems.

IV. RELATED ISSUES

Preliminary coordination with the USACE and resource agencies, prior studies of channel expansion, and discussions with users have identified a number of issues that merit attention when considering channel widening. Following is a brief discussion of the primary issues. In some cases, the applicant did a detailed study of the specific topic. These are available as appendices.

IV.1 Jetty Stability

There was concern that widening the channel by up to 200 feet might undermine the jetties and make them unstable. A study was commissioned that included obtaining additional soil borings and conducting a detailed engineering study of the jetty's stability for a widened channel. The study showed that the jetty stability would not be jeopardized by the proposed widening. That portion of the jetty channel beyond the beach that has a

full jetty can be widened to 600 feet without any risk to the jetty's stability. The inner portion that consists of a heavy revetment along the shoreline can be widened to 550 feet without any risk. Thus, that portion of the channel from station 0+00 to station 43+00 will be widened to 600 feet. Station 43+00 to station 38+00 will be a transition zone with the remaining distance to the Lower Turning Basin (station 38+00 to station 51+84) being widened to 550 feet (Geotechnical Study of Jetty Stability and Channel Widening Project, Freeport Ship Channel, Freeport, Texas; Fugro Consulting, April 2005).

IV.2 Beneficial Use of Dredged Material

The channel widening to 600 feet will generate approximately 2.8 million CY of new material. This is all virgin cut material and consists of 1.2 million CY of clay/silty clay and 0.8 million CY of sand/silty sand (Geotechnical Study of Jetty Stability and Channel Widening Project, Freeport Ship Channel, Freeport, Texas; Fugro Consulting, April 2005). These findings are consistent with prior USACE geotechnical investigations.

The primary beneficial use of the dredged material is to create a topographic high in the form of a berm. It will be built approximately 2.5 miles off the Quintana Beach in 40± feet of water. There is adequate dredged material to build a berm approximately 8,000 feet long by 2,000± feet wide including slopes, to a height of 15 feet.

The primary benefit of the berm will be to fisheries in the form of a topographic high and relatively hard substrate in an area that is very flat and has very soft bottom conditions. A second, and relatively minor, benefit is that the berm may offer some storm protection to a portion of the eroding Quintana Beach during a moderate hurricane.

The dredging is expected to produce approximately 300,000± CY of material that can be used for beach nourishment. To the extent that it can be economically recovered, it will be placed on the beach at Quintana. While not ideal for beach nourishment, approximately 300,000 CY of comparable virgin cut beach quality material was placed on Surfside Beach during the Freeport Harbor 45-Foot Project in the early 1990s with broad public acceptance.

Dredging will be done by pipeline dredge or a mix of pipeline and hopper dredges. Given the current status of the U.S. dredging industry, this flexibility is needed to get the best bid prices. It is likely that a pipeline dredge will be used in the Jetty Reach and a hopper dredge in the Entrance Reach; however, dredging contractors have indicated that a pipeline dredge might be used for both reaches.

IV.3 Cultural Resources

The primary area of potential concern is the 200-foot increment that the channel will be widened. A marine archeological investigation is currently underway. It has been coordinated with USACE archaeologists and is being done to meet applicable USACE standards. The results will be provided to the Galveston District when they are available.

IV.4 Threatened and Endangered Species

The primary endangered species of concern is sea turtles. Dredging protocols have been developed and agreed to for all USACE hopper dredging projects within the Freeport Channel. These same protocols will be applied to the non-federal widening.

IV.5 Water Quality

Sediment samples from borings were subjected to a range of chemical testing to applicable USACE and EPA protocols. The results were then reviewed against the applicable criteria with the results being that no contamination was found that exceeded screening criteria. Consequently, the material meets all criteria for open water placement or for beach nourishment. (Letter Report; PBS&J, Martin E. Arhelger, April 2005)

All reasonable efforts will be made to control sediment dispersion during construction of the berm. This will include (a) control of the dredging operations to maximize generation of clay balls and minimize liquid content, (b) placement of an outfall pipe with deflectors near the bottom, and (c) use of submerged silt curtains around the discharge location.

IV.6 Air Quality

The dredging and placement of approximately 2 million CY will be done over a 4-5 month period. Based on current technology, this will probably generate over 25 tons of NO_x and VOC, thus requiring a Conformity Analysis Review under the Clean Air Act. Once completed, the widening will eliminate significant ship waiting time and associated emissions.

An analysis is currently underway to determine the emissions during dredging and verify that a Conformity Analysis will be required. The same effort is also assessing the potential reduction in ship-related emissions that will result from a decrease in waiting time.

IV.7 Recreation

The Freeport Harbor Channel is widely recognized as a valuable recreational asset that provides small boat access to the Gulf, fishing from the jetties and shoreline, and the opportunity to watch ships from up close. The proposed widening should not negatively impact any of these uses. Potential recreational benefits include improved fishing on the offshore berm and expansion of eroding beaches due to beach nourishment.

IV.8 Cumulative Impacts

The proposed widening is not expected to generate an increase in total ship traffic calling at Freeport. Rather, the widening will remove existing operating constraints, thereby

increasing the efficiency of existing operations. Thus, the widening should have no cumulative impacts.

V. CLOSING

Attached you will find a completed application (USACE form 4345), permit drawings (eight sheets), and supporting information.

We are submitting this application on behalf of the applicant, the Brazos River Harbor Navigation District of Brazoria County, Texas, as authorized on page 1 of the application form.

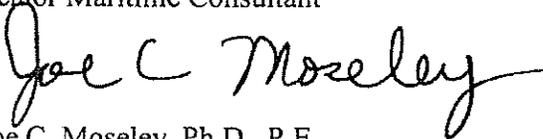
We are requesting that you review this application package as expeditiously as practical. Please contact the undersigned if you need any clarification or additional information.

Sincerely,

SHINER MOSELEY AND ASSOCIATES, INC.



Captain Thomas B. Rodino (USCG Retired)
Senior Maritime Consultant



Joe C. Moseley, Ph.D., P.E.
Principal

JCM/dd

Enclosures

cc with Enclosures: Brazos River Harbor Navigation District (David Knuckey, P.E.)

The public reporting burden for this collection of information is estimated to average 10 hours per response, although the majority of applications should require 5 hours or less. This includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Service Directorate of Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302; and to the office of Management and Budget, Paperwork Reduction Project (0710-0003), Washington DC 20503. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies. Submission of requested information is voluntary, however, if information is not provided, the permit application cannot be processed nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

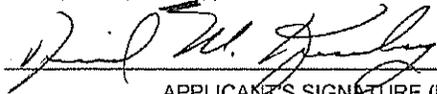
1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETED
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(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME Brazos River Harbor Navigation District	8. AUTHORIZED AGENT'S NAME AND TITLE (<i>an agent is not required</i>) Joe C. Moseley, Ph.D., P.E., Vice President
6. APPLICANT'S ADDRESS P.O. Box 615 Freeport, TX 77542-0615	9. AGENT'S ADDRESS Shiner Moseley and Associates, Inc 555 N. Carancahua, Suite 1650 Corpus Christi, Texas 78478
7. APPLICANT'S PHONE NUMBERS WITH AREA CODE a. Residence b. Business 979-233-2667, ext. 4257	10. AGENT'S PHONE NUMBERS WITH AREA CODE a. Residence b. Business 361-857-2211

11. STATEMENT OF AUTHORIZATION

I hereby authorize Shiner Moseley and Associates, Inc. to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.



APPLICANT'S SIGNATURE (David M. Knuckey, P.E.)

4/14/05

DATE

NAME, LOCATION AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (<i>see instructions</i>) Widening of the Freeport Ship Harbor Jetty and Entrance Channel	
13. NAME OF WATERBODY, IF KNOWN (<i>if applicable</i>) Gulf of Mexico	14. PROJECT STREET ADDRESS (<i>if applicable</i>) N/A
15. LOCATION OF PROJECT Brazoria COUNTY Texas STATE	
16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (<i>see instructions</i>) N/A	

17. DIRECTIONS TO THE SITE

Proceed south from Lake Jackson on SH 332; cross the Gulf Intracoastal Waterway. Turn right at stop light and proceed to end of street that dead-ends at the Ship Channel.

18. Nature of Activity (Description of project, include all features)

- Dredge channel to a maximum bottom width of 600 ft from the Lower Turning Basin to the -51 ft contour, a distance of approximately 4.8 miles.
- Dredging will be performed primarily with pipeline dredge; with the possible use of some hopper dredge.

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

The purpose of the proposed project is to widen the channel to eliminate existing operational constraints that include (a) one-way traffic, (b) daylight operations only for larger vessels, and (c) restrictions that do not allow large vessels requiring waivers to enter port when winds exceed 20 knots or cross-currents exceed 0.5 knots.

USE BLOCKS 20-22 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

Provide beneficial uses: (a) create a berm to provide a topographic high and hard substrate (for habitat and beach protection) and (b) put sand on beach for beach nourishment.

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards

Clay / silty clay 1,200,000 CY
 Sand / sandy silt 800,000 CY
 Total 2,000,000 CY

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

- (a) Offshore berm < 370 acres (including slopes)
- (b) Beach nourishment < 10 acres of new beach area at initial equilibrium

23. Is Any Portion of the Work Already Complete? Yes No IF YES, DESCRIBE THE COMPLETED WORK

24. Addresses of Adjoining Property Owners, Lessees, etc., Whose Property Adjoins the Waterbody (if more than can be entered here, please attach a supplemental list).

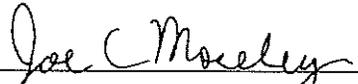
See Sheet 8 of attached permit drawings.

25. List of Other Certifications or Approvals/Denials Received from other Federal, State, or Local Agencies for Work Described in This Application

AGENCY	TYPE APPROVAL *	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED
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* Would include but is not restricted to zoning, building and flood plain permits

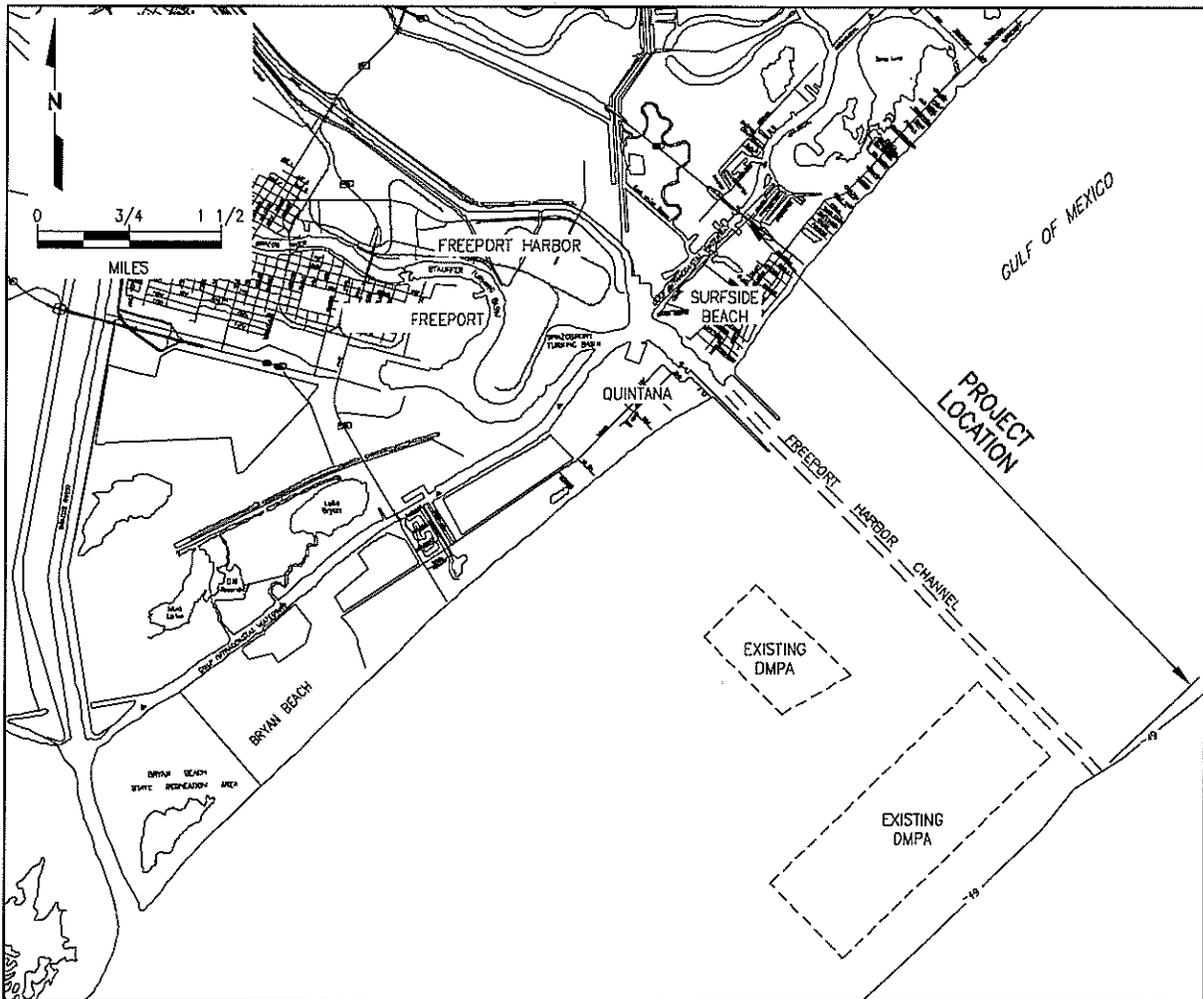
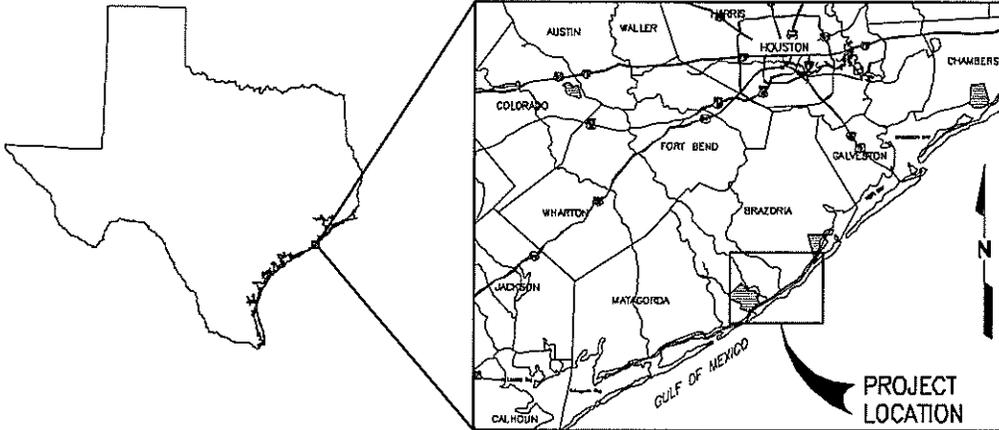
26. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

N/A	N/A		4/14/05
SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT - Shiner Moseley	DATE

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in Block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States, knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than \$10,000 or imprisoned not more than five years or both.

PROJECT LOCATION



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FOR COE USE ONLY

Permit Application No.:

APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT

COUNTY: BRAZORIA

PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL



SHINER MOSELEY AND ASSOCIATES, INC. ENGINEERS & CONSULTANTS

555 North Carnoosmas Street, Suite 1650 Corpus Christi, Texas 78478

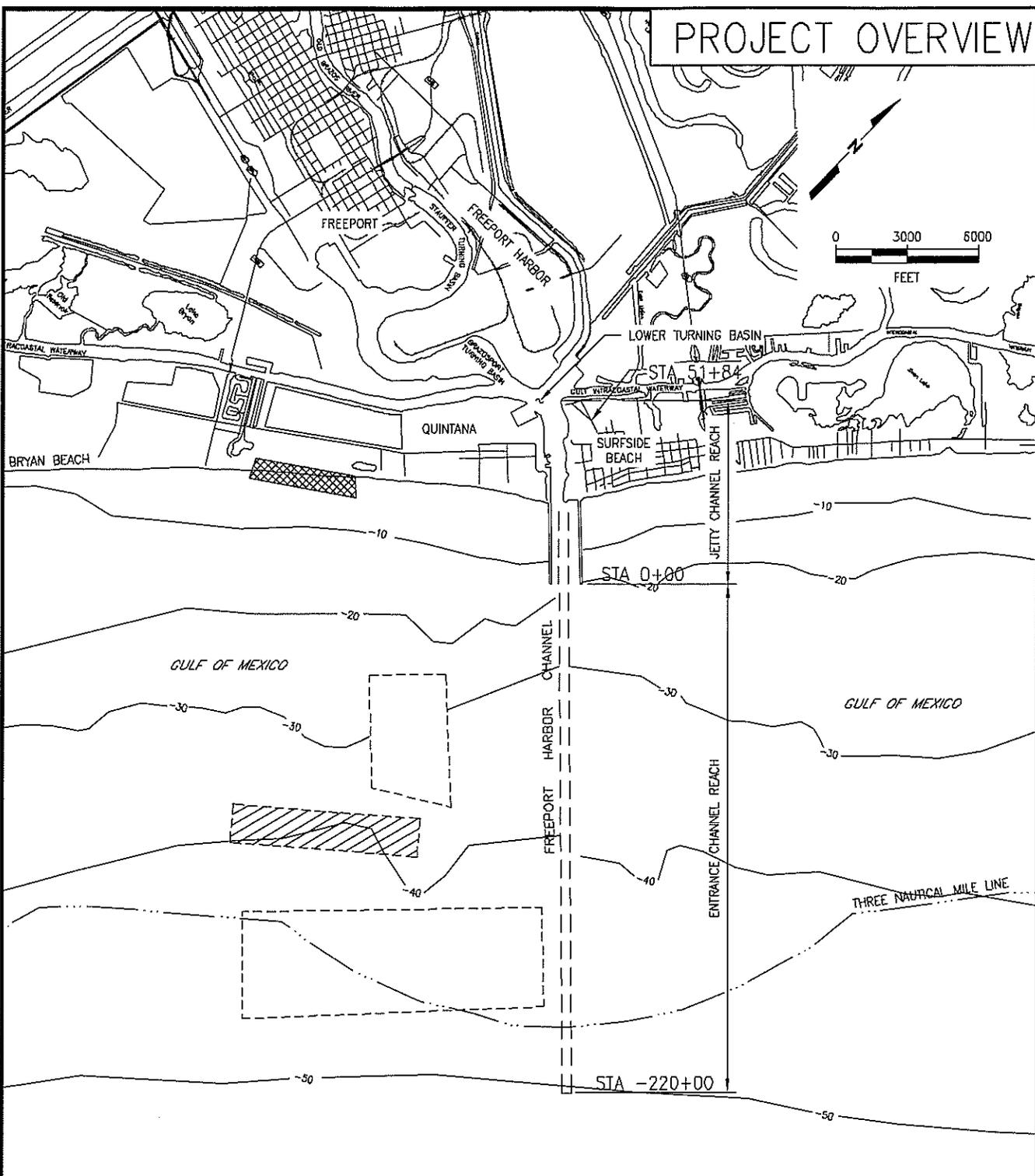
DATE: 4/15/05

REV. DATE:

DATUM: USACE MLT

PROJECT No: 200.40142.00 SHEET 1 of 8

PROJECT OVERVIEW



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LEGEND:

-  PROPOSED NEW BENEFICIAL USE AREA: BERM FOR HABITAT
-  PROPOSED BEACH NOURISHMENT AS BENEFICIAL USE
-  EXISTING USACE DMPA



FOR COE USE ONLY

Permit Application No.:

APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT COUNTY: BRAZORIA

SHINER MOSELEY AND ASSOCIATES, INC.
ENGINEERS & CONSULTANTS
555 North Carnoosma Street, Suite 1650 Corpus Christi, Texas 78478

PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL

DATE: 4/15/05

REV. DATE:

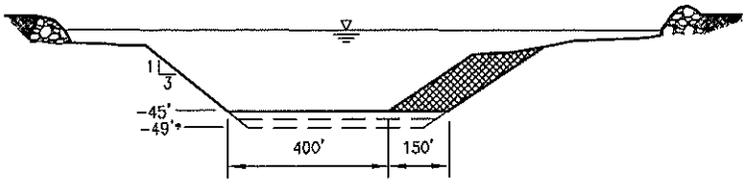
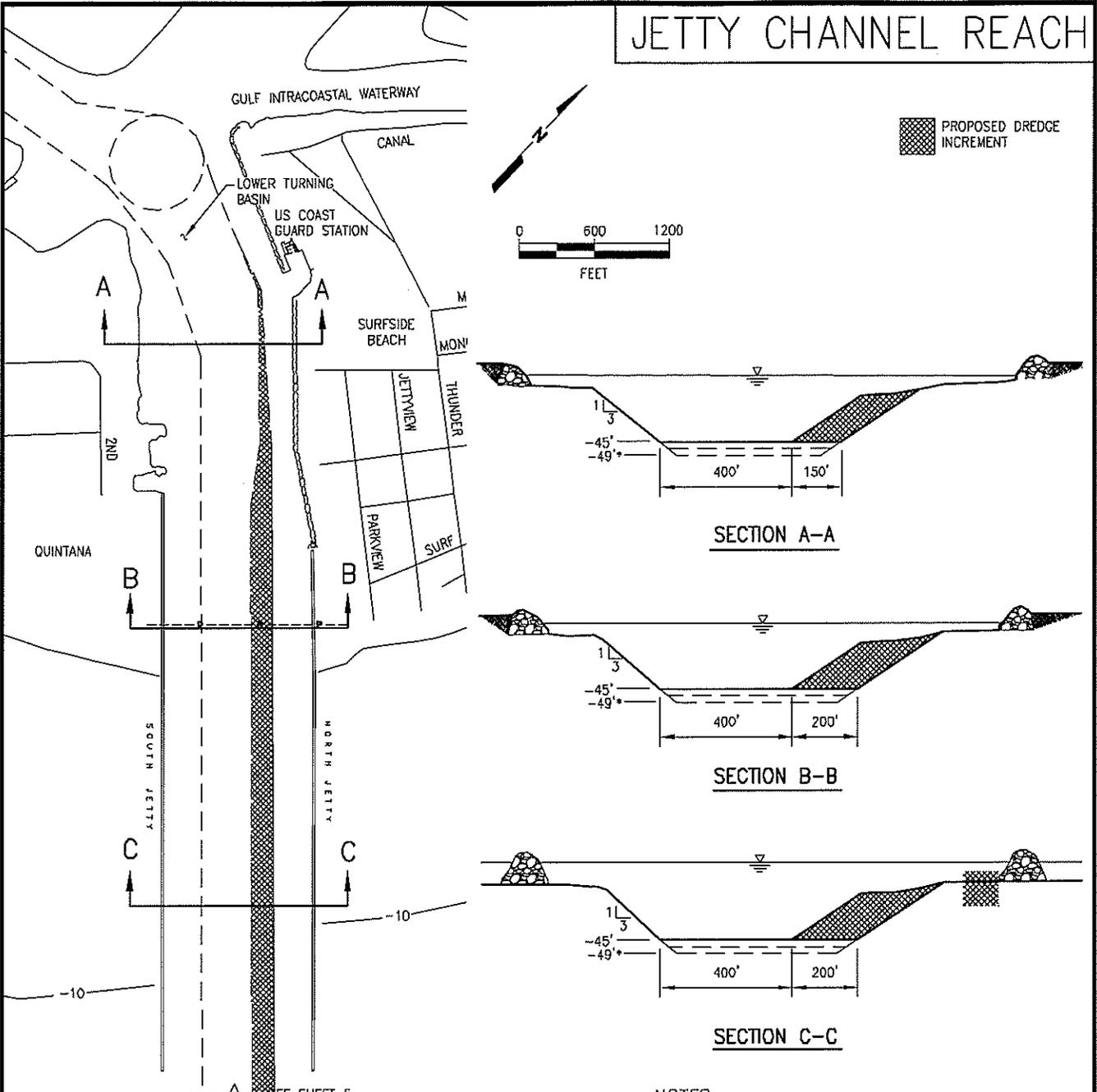
DATUM: USACE MLT

PROJECT No: 200.40142.00

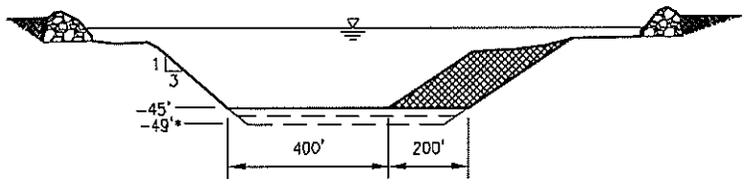
SHEET 2 of 8

PRELIMINARY DRAFT

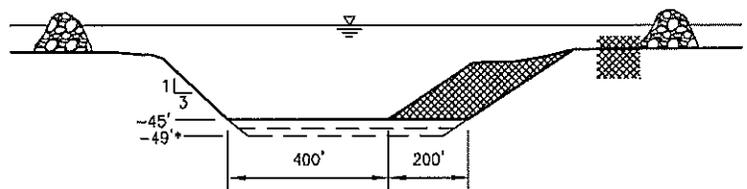
JETTY CHANNEL REACH



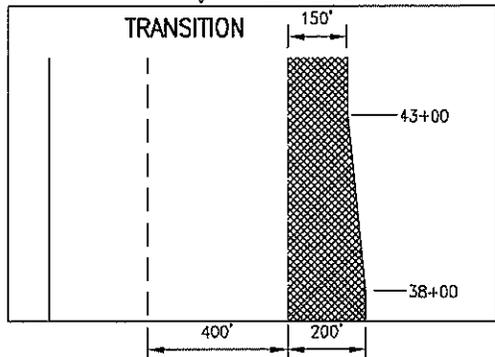
SECTION A-A



SECTION B-B



SECTION C-C



NOTES:

* INCLUDES 2' OF MAINTENANCE PLUS 2' OF OVERDREDGE

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FOR COE USE ONLY

Permit Application No. _____

APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT COUNTY: BRAZORIA

PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL

DATE: 4/15/05 REV. DATE: DATUM: USACE MLT

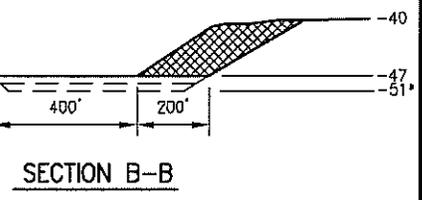
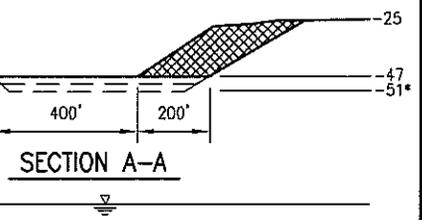
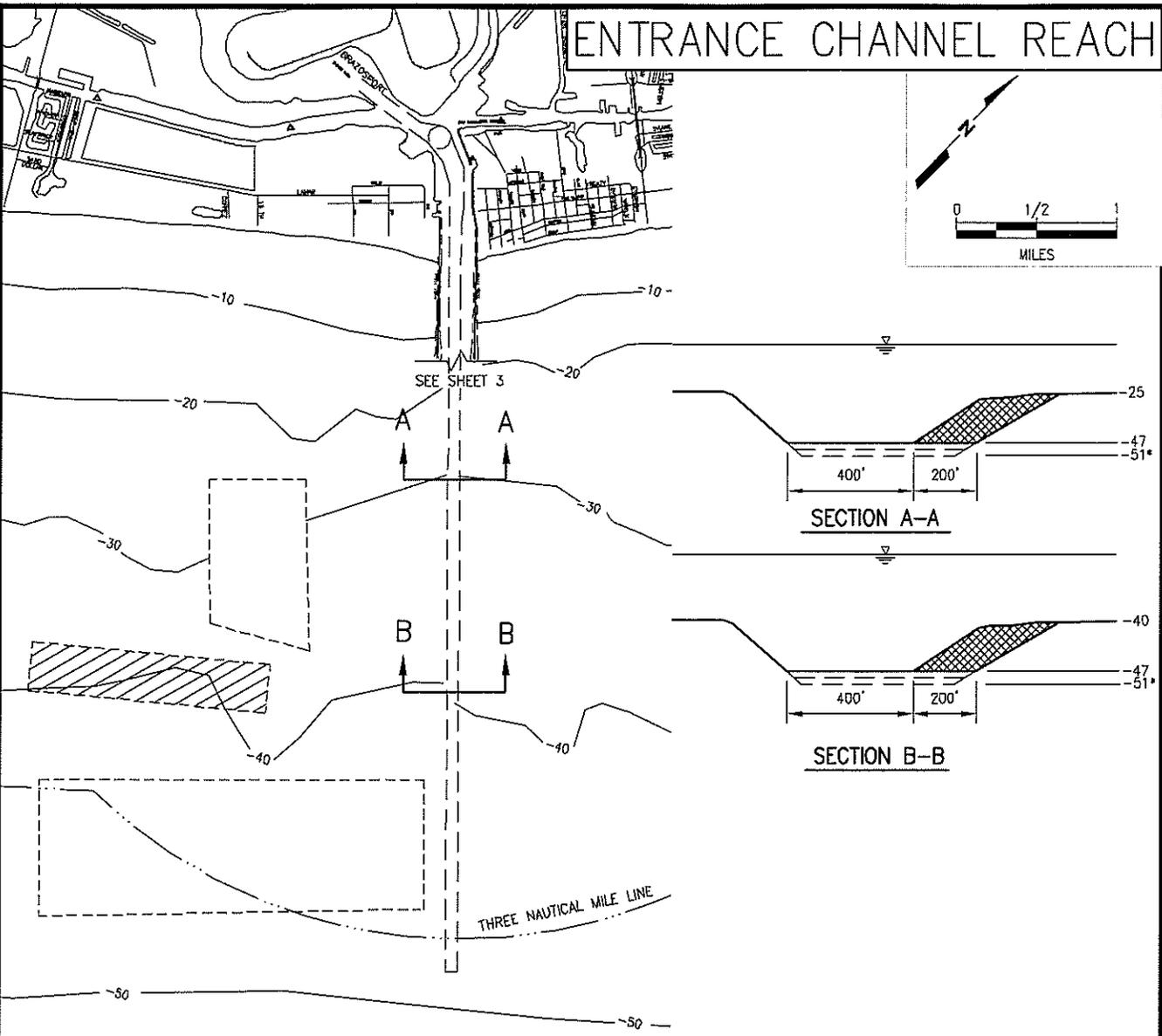
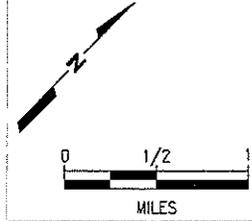


SHINER MOSELEY AND ASSOCIATES, INC. ENGINEERS & CONSULTANTS

555 North Caranoola Street, Suite 1650 Corpus Christi, Texas 78478

PROJECT No: 200.40142.00 SHEET 3 of 8

ENTRANCE CHANNEL REACH



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LEGEND:

- PROPOSED DREDGE INCREMENT
- PROPOSED NEW BENEFICIAL USE AREA: BERM FOR HABITAT
- PROPOSED BEACH NOURISHMENT AS BENEFICIAL USE (SEE SHEET 7)
- EXISTING USACE DMPA

NOTES:

* INCLUDES 2' OF MAINTENANCE PLUS 2' OF OVERDREDGE



FOR COE USE ONLY

Permit Application No.: _____

APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT COUNTY: BRAZORIA

PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL

DATE: 4/15/05 REV. DATE: _____ DATUM: USACE MLT

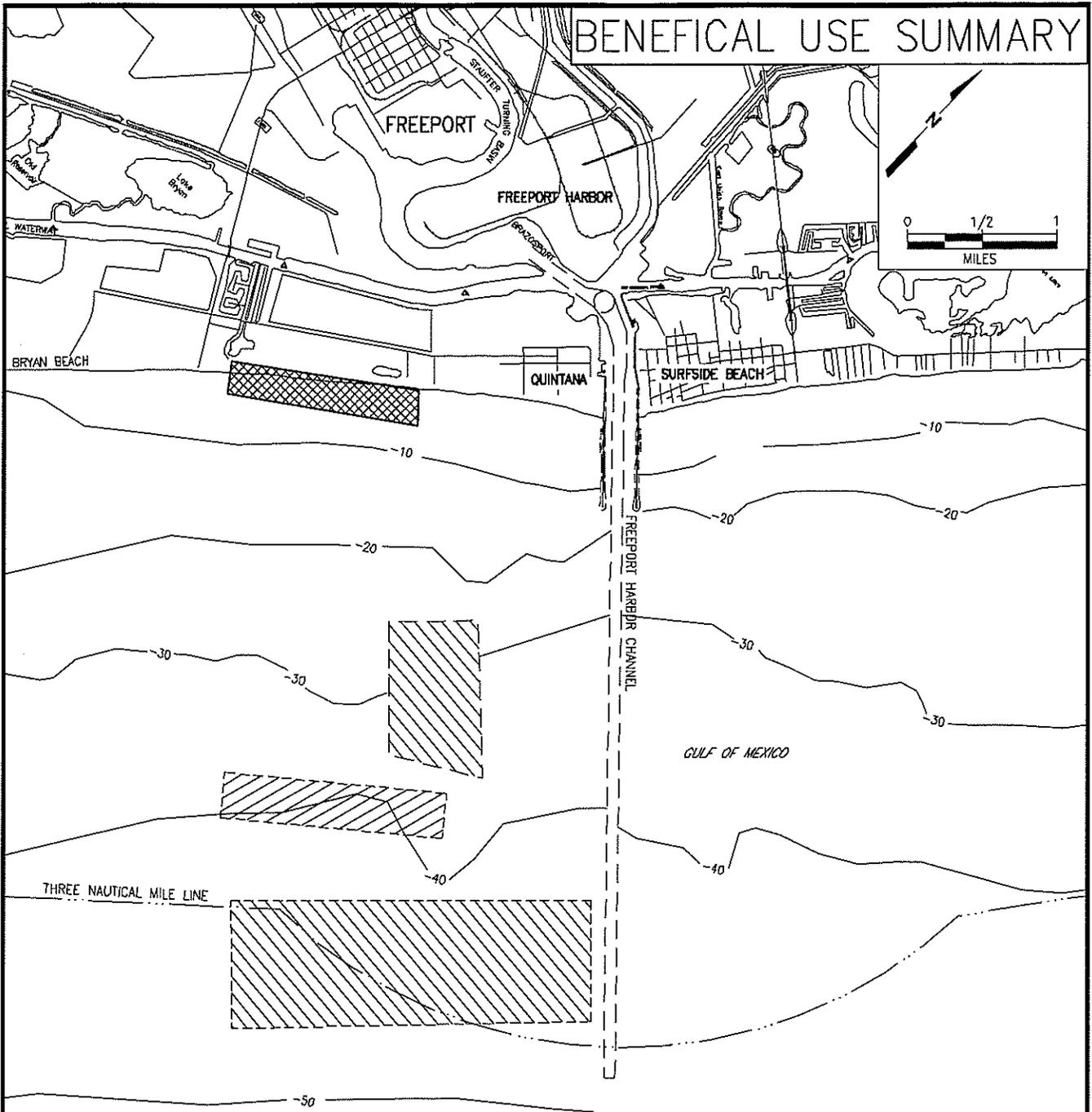


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ENGINEERS & CONSULTANTS

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PROJECT No: 200.40142.00 SHEET 4 of 8

BENEFICIAL USE SUMMARY



NOTES:

-  OFFSHORE BENEFICIAL USE AREA. CONSTRUCT A BERM OF TO PROVIDE HARD SUBSTRATE AND TO OFFER LIMITED BEACH PROTECTION. SEE SHEET 6 OF 8.
-  BEACH QUALITY MATERIAL, IF FOUND IN ECONOMICALLY RECOVERABLE QUANTITIES, WILL BE USED AS BEACH NOURISHMENT FOR SURFSIDE BEACH. SEE SHEET 7
-  EXISTING USACE DMPA

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Permit Application No.:

APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT COUNTY: BRAZORIA



SHINER MOSELEY AND ASSOCIATES, INC. ENGINEERS & CONSULTANTS

PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL

555 North Caranoghus Street, Suite 1630 Corpus Christi, Texas 78478

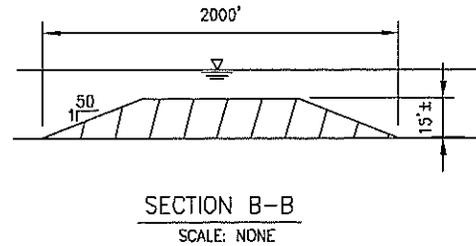
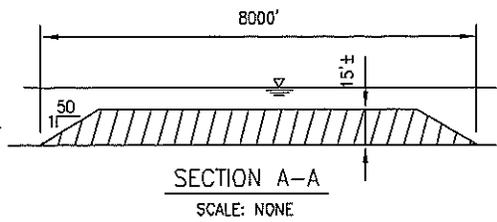
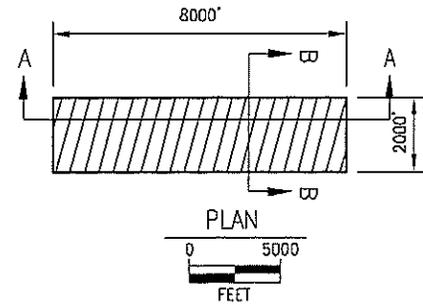
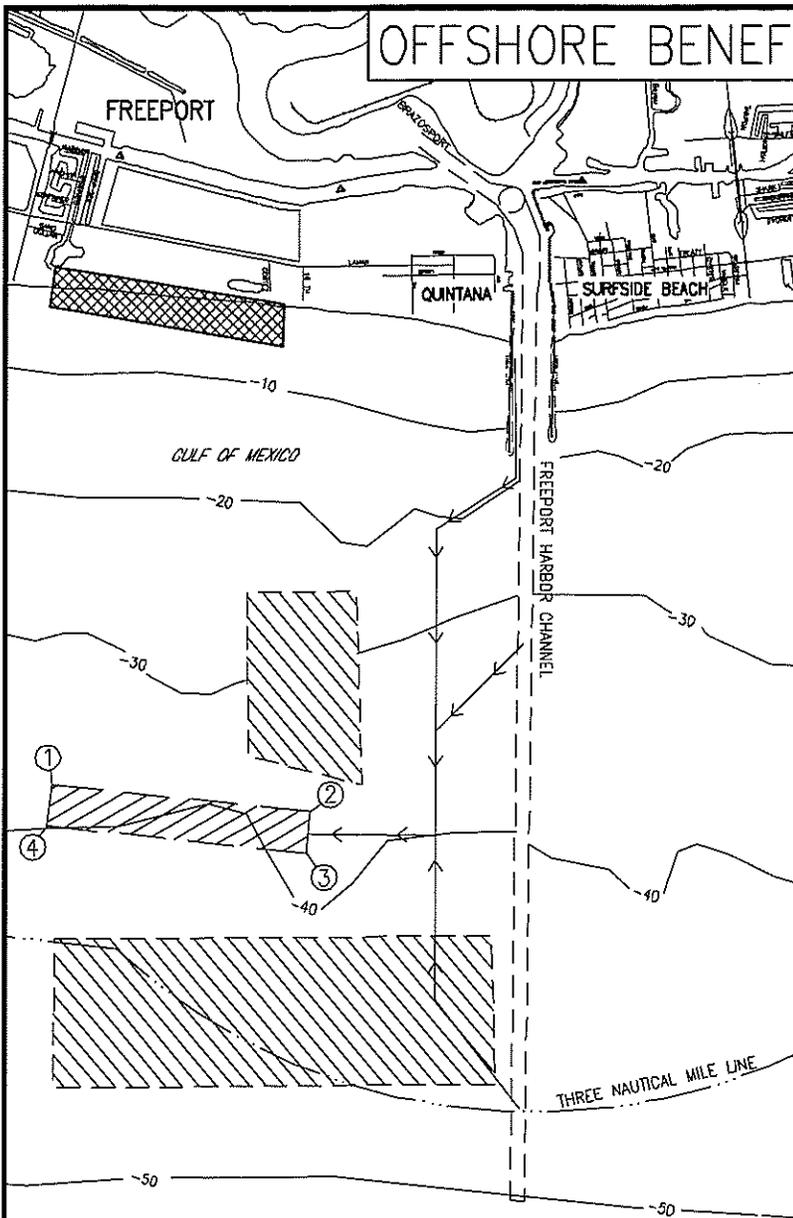
DATE: 4/15/05

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DATUM: USACE MLT

PROJECT No: 200.40142.00 SHEET 5 of 8

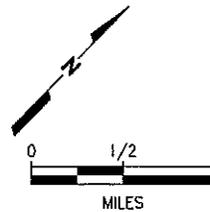
OFFSHORE BENEFICIAL USE AREA-BERM



NOTES:

LEGEND

- PROPOSED BEACH NOURISHMENT
- PROPOSED OFFSHORE BENEFICIAL USE AREA
- ① N28°53'05" W95°15'12"
- ② N28°53'54" W95°17'01"
- ③ N28°53'37" W95°16'48"
- ④ N28°52'48" W95°17'59"
- EXISTING USAGE OFFSHORE PLACEMENT AREAS
- PIPELINE ROUTING (TYPICAL)



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APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT COUNTY: BRAZORIA



SHINER MOSELEY AND ASSOCIATES, INC.
ENGINEERS & CONSULTANTS

PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL

555 North Carondelet Street, Suite 1650 Corpus Christi, Texas 78478

DATE: 4/15/05

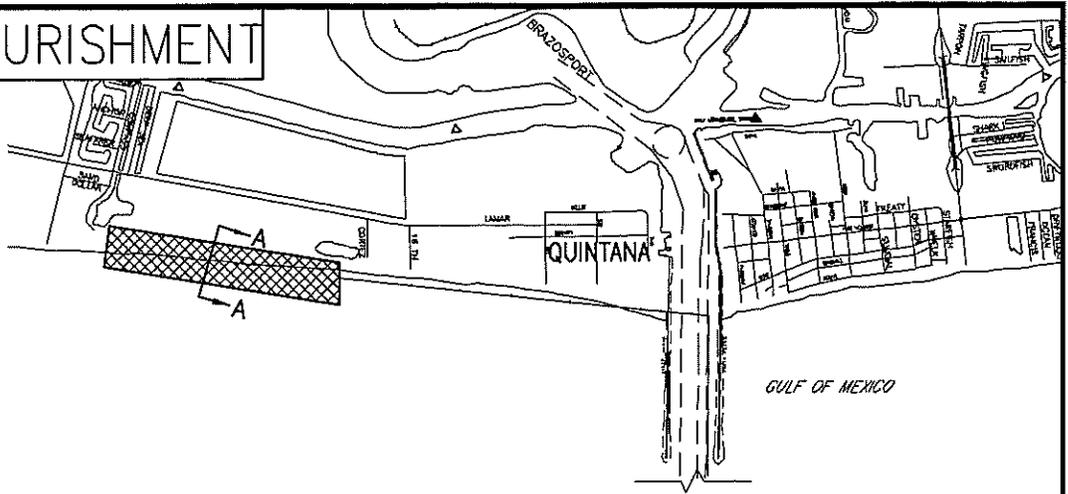
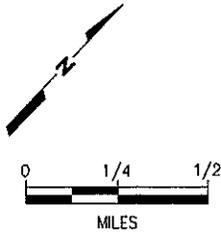
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PROJECT No: 200.40142.00

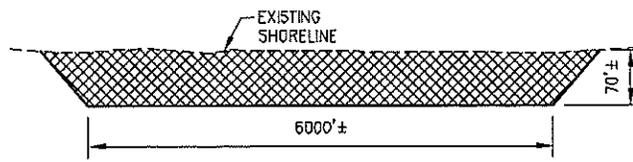
SHEET 6 of 8

BEACH NOURISHMENT

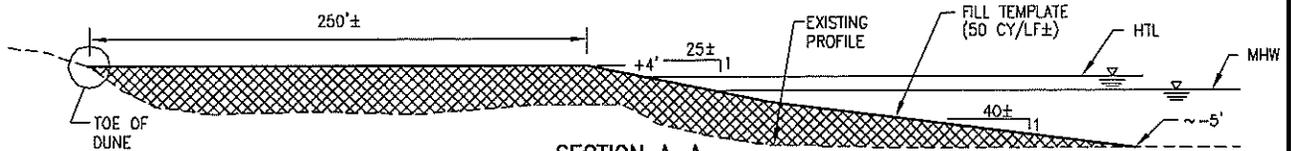


GULF OF MEXICO

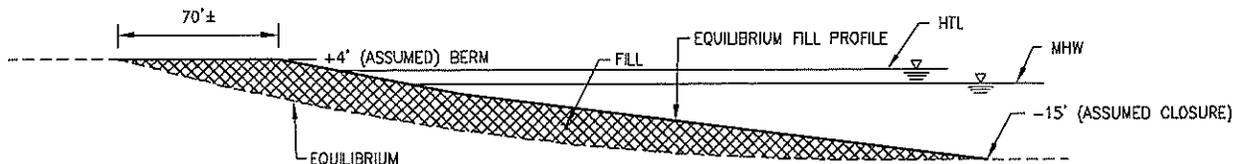
GULF OF MEXICO



PLAN VIEW AT INITIAL EQUILIBRIUM
(MATERIAL MAY BE PLACED AT ONE OR BOTH LOCATIONS)



**SECTION A-A
INITIAL PLACEMENT**



**SECTION A-A
AT INITIAL EQUILIBRIUM**

NOTES:

- MHW = 3.28 MLT; HTL = 5.01 MLT
- BEACH FILL LENGTH WILL DEPEND ON THE AMOUNT OF RECOVERABLE BEACH QUALITY MATERIAL; 300,000 CY WOULD CONSTRUCT APPROXIMATELY 6000 LF OF BEACH AT A FILL TEMPLATE OF 50 CY/LF. THIS WOULD CREATE APPROXIMATELY 9± ACRES OF BEACH AREA AT INITIAL EQUILIBRIUM.

LEGEND

- PROPOSED BEACH NOURISHMENT
- PIPELINE ROUTING (TYPICAL)



FOR COE USE ONLY

Permit Application No.:

APPLICANT: BRAZOS RIVER HARBOR NAVIGATION DISTRICT

COUNTY: BRAZORIA

PURPOSE: WIDEN EXISTING ENTRANCE AND JETTY CHANNEL



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ENGINEERS & CONSULTANTS

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DATE: 4/15/05

REV. DATE:

DATUM: USACE MLT

PROJECT No: 200.40142.00 SHEET 7 of 8

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ADJACENT PROPERTY OWNERS

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FOR COE USE ONLY

Permit Application No.: _____

APPLICANT: PORT OF FREEPORT	COUNTY: BRAZORIA
PURPOSE: WIDEN EXISTING SHIP CHANNEL	
DATE: 4/15/05	REV. DATE:
DATUM: USACE MLT	



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PROJECT No: 200.40142.00 SHEET 8 of 8

Exhibit B-Habitat Assessment

**HABITAT ASSESSMENT OF POTENTIAL DREDGED MATERIAL
PLACEMENT SITES
FREEPORT SHIP CHANNEL WIDENING PROJECT
FREEPORT, TEXAS**

Background

Future widening of the Freeport Ship Channel will necessitate the disposal of approximately 3 million cubic yards (MCY) of dredged material. Prior to consideration of the disposal of this material into a designated Ocean Dredged Material Disposal Site (ODMDS), identification and assessment of other potential beneficial use (BU) areas and upland confined placement alternatives must be considered.

During a Dredged Material Management Plan (DMMP) workshop in December 2005, three potential BU areas were identified in addition to previously-identified offshore sites:

1. Swan Lake
2. 332 Bridge
3. Bryan Lake

These areas were targeted due to their significant size and potential open water capacity. During a follow-up meeting in January 2006 and a subsequent desktop investigation and field visit, the consensus of the resource agencies was that Swan Lake could be removed as a viable beneficial use area due to the significant presence of oysters and fishing activities. However, resource agencies requested that a habitat assessment be conducted for the 332 Bridge and Bryan Lake marsh areas. The following presents the results of the habitat assessment.

Habitat Assessment

A habitat assessment was conducted of two potential BU sites, 332 Bridge and Bryan Lake, in the Freeport, Texas area by Kim Halbrook and Chemaine Sahadi of HDR/SMA and Kathy Calnan of PBS&J on January 23, 2006. Chemaine is the primary author of this Habitat Assessment. These sites were surveyed for potential marsh restoration/creation opportunities. The habitat assessment considered the following factors:

- (1) Approximate acreage of open water that could be elevated for low marsh plant growth;
- (2) Approximate acreage of high marsh and how it is located relative to the low marsh;
- (3) Presence of oysters; and
- (4) Marsh restoration/creation potential

The following is a brief description of each site and a summary of habitat assessment results.

332 Bridge

The 332 Bridge site is located approximately one mile northeast of the Freeport Jetty Channel (Exhibit 1). Photographs of the site taken during the January 23rd site visit are provided in Exhibit 2. This 328 acre site is comprised of four potential BU areas including a four acre area located at the northern corner of the site, a four acre area located at the eastern corner of the site, a 12 acre area located just south of Hwy 332 near the western extent of the site, and a 42 acre area located at the southern corner of the site (Exhibit 1). A fifth potential BU area was identified and considered as well; this area is approximately 14 acres in size and is located adjacent to the 12 acre area described above.

The January 23rd site visit revealed that approximately 132 acres of the 328 acre site is low marsh and consists of characteristic wetland vegetation including *Spartina alterniflora*, *Distichlis spicata*, *Batis maritima*, and *Salicornia virginica*. Also observed within the low marsh habitat were vegetated flats consisting mostly of *Monanthochloe littoralis* and *Salicornia virginica*. Open water areas that could be elevated for low marsh plant growth occupy approximately 76 acres of the site. Open water areas at the site appear to be tidally connected via a natural channel that connects to an existing drainage canal at both the northwestern and southwestern ends of the site (Exhibit 1). Approximately 7 acres of the 328 acre site contain oyster beds. A test pit sample at the 328 acre site revealed a low chroma silty clay soil, which is indicative of hydric soils.

The northern four acre area is an open water pond which is connected to adjacent water bodies via the natural channel. The pond is surrounded by functional low salt marsh habitat consisting mostly of *Spartina alterniflora*. This low marsh transitions into high salt marsh and vegetated flats to the south. The water in the pond is approximately 1-1.5 ft. deep at this location. No evidence of oysters was observed (Exhibit 1). During the site visit, several waterfowl species, including Reddish Egrets, Griefs, and Great Egrets, were observed utilizing this area.

The eastern four acre area is located adjacent to Hwy 332 and due to low tide, was not inundated during the site visit. This area is also surrounded by functional low marsh habitat consisting mostly of *Spartina alterniflora*. Several oyster beds, with an approximate total acreage of 0.1 acres, were observed fringing the perimeter of the area (Exhibit 1). Approximately 60% oyster coverage was observed within the 0.1 acre area. The natural channel also provides tidal influence to this location.

The 12 acre area is located adjacent to an upland area containing a Texaco Station and a fish market. The area consists of functional estuarine low marsh habitat and an open water area approximately 1-1.5 ft. in depth. The area also contains several oyster beds with an approximate total acreage of 0.3 acres and an estimated percent coverage of 60%. Oyster beds were also located along an existing channel adjacent to the 12 acre area. Oyster beds within this channel have an approximate total acreage of 0.6 acres with an estimated percent coverage of 60% (Exhibit 1). Conversations with Mr. Kurt Evans, owner of the Texaco Station, revealed that historically most of the 12 acre area consisted

of low marsh habitat with little open water. Over time, it appears that subsidence has caused a transition from a dominant low marsh habitat to a more open water habitat with functional fringing low marsh. Mr. Evans also presented an historical aerial photo of the area, dated early 1980s, that showed low marsh habitat extending approximately 10-15 ft. from the upland area with little open water.

The 42 acre area consists mostly of open water with a few fringing low marsh areas along its western boundary (Exhibit 1). Several oyster reefs, with an approximate total acreage of 6 acres, were observed along the western boundary of the 42 acre area (where the natural channel flows through this location) and also in several locations within the middle of the water body (Exhibit 1). It should also be noted that small scattered oyster clumps were appeared to be located in other parts of the area. Approximately 30% oyster coverage was observed within the 6 acre area. Water depths during the site visit were approximately 2-2.5 ft. Mr. Evans stated that historically, the 42 acre area contained more of a low marsh habitat but that over time subsidence had transitioned the area to open water. He estimated that 60% of the existing open water areas were marsh 30 years ago. He also stated that this area was frequently used for fishing.

The 14 acre area consists entirely of open water with fringing low marsh along its eastern, northern and western boundaries and the drainage canal along its western boundary, with a large opening into the canal. Based on conversations with Mr. Evans this area was excavated for fill material approximately 40 to 50 years ago. The water depth in this area is roughly 5-6 ft. on average with a soft bottom. Mr. Evans also stated that this area is an extremely popular recreational fishing area with a typical abundance of trout, redfish and flounder being caught.

Marsh Restoration/Creation Potential at 332 Bridge Site:

Both the northern and eastern 4 acre sites are surrounded by healthy functional marsh and do not have the capacity to receive a substantial quantity of dredged material from the project (approximately 3,200,000 CY total and 300,000 CY of silty sand material from the jetty channel). Water depths at these locations are shallow (1-1.5 ft at northern 4 acre site; 0-1 ft. at eastern 4 acre site) and site acreages are too small to utilize a significant amount of dredged material for marsh restoration. In addition, the shallow open water of these sites provides diversity within the entire existing low marsh complex and infilling would likely reduce rather than improve the habitat quality.

The 12 acre area also appears to be a healthy functional marsh consisting of low marsh habitat interspersed with shallow open water areas. In our opinion, it appears that this area may not benefit from additional dredged material to raise elevations for low marsh vegetation growth. The 12 acre open water area also provides circulation, habitat diversity and contains several oyster beds that would most likely be displaced should dredged material be placed in this area.

Of the potential BUs at the 332 Bridge site, the 42 acre area and the 14 acre area appear to have the most potential for marsh creation / restoration. The 42 acre area is almost entirely open water with water depths of 2-2.5 ft; however a deeper water natural channel is still apparent on the aerial photo. If many of the oyster beds correspond to the edges of

this 'channel', dredged material may be strategically placed to avoid them. The goal of dredged material placement would be to raise elevations to a water depth (1-1.5 ft) that would be suitable for low marsh vegetation such as *Spartina alterniflora* establishment. Although there are several oyster beds within the 42 acre area, they are found mostly on the western fringe and are distributed sparsely within the main water body. The 14 acre area is open water with depths of 5-6 ft. If dredged material is placed to raise the elevation to 1-1.5 ft., low marsh vegetation would likely establish. The primary drawback of filling this area would be the loss of recreational fishing grounds. Should these potential BU areas be utilized, well-controlled placement of the dredged material, maintenance and/or creation of tidal conveyances, and containment measures to prevent material from entering the drainage canal would be needed.

Bryan Lake

The Bryan Lake site is located approximately three miles west of the Freeport Jetty Channel (Exhibit 3). Photographs of the site taken during the January 23rd site visit are provided in Exhibit 2. The roughly 913 acre site is comprised of three potential BU areas including a 100 acre area, 30 acre area, and 50 acre area. The 30 acre and 100 acre areas are located just east of the Bryan Mound Strategic Petroleum Reserve facility. The 50 acre area is located east of the 100 and 30 acre areas.

The January 23rd site visit revealed that approximately 660 acres of the 913 acre site is low estuarine marsh and consists of characteristic wetland vegetation including *Spartina alterniflora*, *Bolboschoenus robustus*, *Distichilis spicata*, *Batis maritima*, and *Salicornia virginica*. *Spartina alterniflora* mainly fringes the perimeter of the marsh. In some areas, *Bolboschoenus robustus* is found growing immediately landward of *Spartina alterniflora*. High marsh habitat consisted mostly of *Iva frutescens* which fringed the perimeter of the marsh just landward of *Spartina alterniflora* and *Bolboschoenus robustus*. Open water areas that could be elevated for low marsh plant growth occupy approximately 180 acres of the site. The 100 acre and 30 acre sites appear to be tidally connected to the Gulf Intracoastal Waterway (GIWW). Approximately 6 acres of the site contains oyster beds.

The 100 acre area can be characterized as open water. A natural channel connects the 100 acre area with the 30 acre area and the GIWW. Low marsh habitat surrounds the 100 acre area and several oyster beds were observed fringing the shoreline on the northern section of the water body. Scattered oyster beds, with an approximate total acreage of 5.8 acres were also observed within the main water body and along connecting channels at this location. Approximate percent coverage of oysters within the 5.8 acre area is estimated at 70%. Water elevations at this location were approximately 1-1.5 ft. During the site visit, several waterfowl, including Great Egrets and Roseate Spoonbills, were observed utilizing this area.

The 30 acre area is tidally connected to the 100 acre area and the GIWW via a natural channel. Low marsh habitat surrounds the perimeter of this area and evidence of oyster beds was observed. Approximately 0.2 acres of oyster beds were located within the 30 acre area with an estimated percent coverage of 60%. Several waterfowl species, including a flock of Roseate Spoonbills, were seen utilizing this area. Water depths at this location are approximately 1-1.5 ft, on an average tide.

The 50 acre area, located east of the other two sites, is also surrounded by low marsh habitat. A natural channel connects this area to the GIWW and water depth at this location is less than 1 ft. A small oyster bed was observed at the mouth of the natural channel, with an approximate acreage of 0.4 acres and an estimated percent coverage of 50%. Several waterfowl species were also seen utilizing this site.

Marsh Restoration/Creation Potential at Bryan Lake:

The three open water areas at Bryan Lake are not well suited as viable BUs. All three water bodies are shallow (1.5 ft or less) and contain oysters. The surrounding low marsh habitat is healthy and functional and the area does not appear to require additional dredged material to raise elevations for low marsh vegetation growth. In addition, the shallow open water of these sites provides diversity within the entire existing low marsh complex. This area also appears to be frequently utilized by waterfowl for foraging and loafing.

Conclusion and Recommendations

It is our opinion that of the sites reviewed during the January 23rd site visit, only the 42 acre area and the 14 acre area located within the 332 Bridge site should be considered potentially viable BU options for the placement of dredged material. Although these areas are considered potentially viable for this purpose, it must be reiterated that filling of these areas to create low marsh vegetation grounds will negatively impact some functioning oyster beds as well as popular and functioning recreational fishing grounds.



HDR | SHINER MOSELEY
AND ASSOCIATES, INC.
488 N. Greenbush, Suite 1600
Corpus Christi, Texas 78402

SMA JOB NO.: 200.50170

PORT OF FREEPORT

FREEPORT CHANNEL WIDENING

POTENTIAL BU AREAS

EXHIBIT 1



View looking northwest of low marsh and open water habitat at the 332 Bridge Site. An existing levee can be seen in the background (01/22/06).



View looking north of open water habitat at the 332 Bridge site. The northern 4 acre area can be seen in distance (01/22/06).



Close-up view of typical existing low marsh habitat at the 332 Bridge Site (01/22/06).



View looking northwest of low marsh habitat (in the foreground) and high marsh habitat (in the background). High marsh habitat (i.e. vegetated flats) can be recognized by their darker color. (01/22/06)



View looking northeast of northern 4 acre area (01/22/06).



View looking northwest of northern 4 acre area (01/22/06).



View looking southeast of 12 acre area (01/22/06).



Closer view of 12 acre area looking southwest (01/22/06).



View looking southwest of 12 acre tract (01/22/06).



View looking south of 42 acre area. Oyster reefs can be seen scattered throughout this location (01/22/06).



Close-up view looking east of 42 acre area (01/22/06).



View looking east of eastern 4 acre area. This area was not inundated during the January 22nd site visit (01/22/06).



Closer view of eastern 4 acre site looking northeast (01/22/06).



View looking southeast of 100 acre area at the Bryan Lake Site. Note the oyster reefs located within the main waterbody (01/22/06).



View looking east along eastern channel of 100 acre area. Note oyster beds fringing the shoreline (01/22/06).



View looking east along eastern shoreline of the 100 acre area (01/22/06).



View looking southwest of oyster beds located within the 100 acre area (01/22/06).



View looking west along existing channel that connects to 100 acre area. Note oysters within the channel (01/22/06).



View looking west of high marsh habitat that fringes the 100 acre, 30 acre, and 50 acre areas. High marsh habitat consists mostly of *Iva frutescens* (01/22/06).



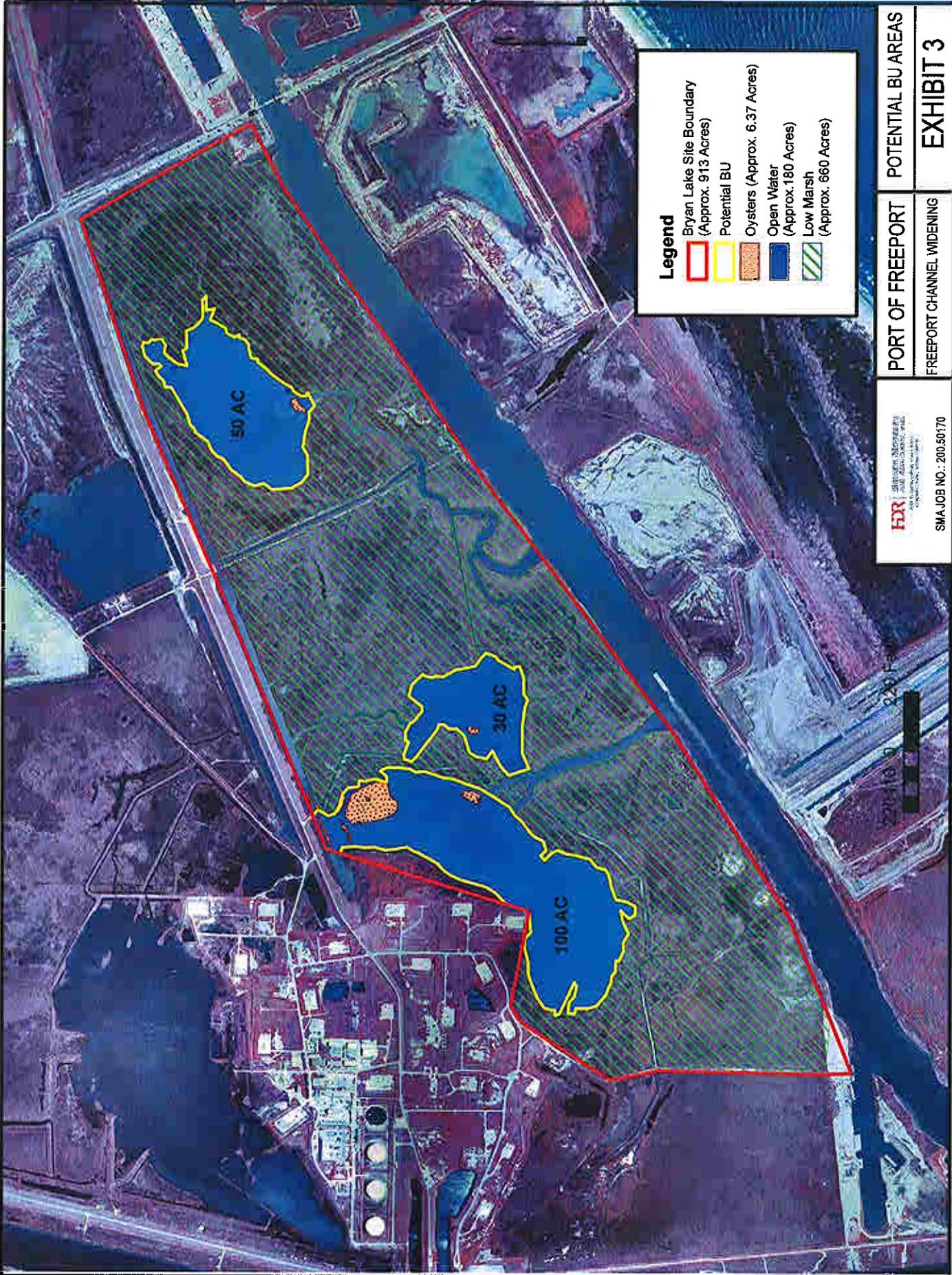
View looking west of 50 acre area (01/22/06).



View looking southwest of 50 acre area (01/22/06).



View looking south of 50 acre area (01/22/06).



Legend

- Bryan Lake Site Boundary (Approx. 913 Acres)
- Potential BU
- Oysters (Approx. 6.37 Acres)
- Open Water (Approx. 180 Acres)
- Low Marsh (Approx. 660 Acres)

 HDR <small>Hatch Mott MacDonald</small>	PORT OF FREEPORT FREEPORT CHANNEL WIDENING	POTENTIAL BU AREAS EXHIBIT 3
SMA JOB NO.: 200.50170		